(d) determining whether said second response intensity is greater than said first response intensity, thereby validating that a sensor array detection ability mimics a human nose detection ability.--

Marked up copies of the amended claims are set forth in Appendix A. For the Examiner's convenience, a list of the pending claims is set forth in Appendix B.

REMARKS

After entry of the amendments, claims 9-15 and 17 are pending in this application. In order to expedite prosecution, claims 1-8 and 16 have been canceled, claim 9 has been amended, and claim 17 is newly added. Applicants expressly reserve the right to pursue claims of the original scope in future applications.

Claims 1-16 were rejected under 35 U.S.C. § 101 for alleged inoperativeness. Claims 1-16 were rejected under 35 U.S.C. § 112, second paragraph, for alleged indefiniteness and lack of utility. Claims 1–7 and 9-15 were rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by "any sensor which operates by responding to an analyte to produce a response."

THE INVENTION

This present invention relates to methods for establishing that sensor arrays mimic the behavior of human noses. It is known that two odorants at constant fractions of their particular vapor pressures will elicit the same response from a human nose. It is also known that odorants with lower vapor pressures elicit greater responses from a human nose and therefore have lower mean human nose detection thresholds, *i.e.*, they are detected more easily. Prior to the advent of the present invention, it was not known that an electronic nose responded in the same manner as a human nose. As described in the specification, Applicants have found that an electronic nose, like a human nose, produces higher response intensities for odorants with low vapor pressures and lower response intensities for odorants with high vapor pressures. Accordingly, an

electronic nose also produces similar response intensities to odorants at the same constant fraction of their vapor pressure.

By determining whether sensor arrays behave in a manner similar to human noses, this invention provides an important tool for establishing the importance of the use of sensor arrays for odorant detection.

FORMAL MATTERS

Amendments to claim 9 were made and new claim 17 was added to clarify the features of the present invention. Support for the amendments and the new claim is found throughout the specification as originally filed. In particular, support is found, *inter alia,* on page 9, line 5 and page 14, lines 4-14.

In view of the foregoing support, Applicants believe no new matter has been introduced and respectfully request that the claims be entered.

CLAIM REJECTIONS UNDER 35 U.S.C. § 101

The Examiner has rejected claims 1-16 under 35 U.S.C. § 101 for allegedly being inoperative as claimed. Specifically, the Examiner fails to see how an electronic nose response can *match* a human nose response. To expedite prosecution, Applicants have incorporated the Examiner's suggestions and amended the claims to recite a "method for validating that a sensor array detection ability mimics a human nose detection ability." To the extent the rejection is applicable to the new claim language, Applicants respectfully traverse the rejection.

Applicants assert that the methods recited in amended independent claims 9 and 17 are clearly operative. It is well established that human noses respond in certain ways to different odorants. For example, as described in the specification, odorants with higher vapor pressures elicit lower response intensities than odorants with lower vapor pressures (*see,* Figure 2, Panel A, described on page 13, lines 1-5). In addition, odorants at a constant fraction of their vapor pressure elicit responses of similar intensity (*see,* page 13, line 28, bridging to page 14, line 14).

Thus, in one embodiment, the present invention provides a method, wherein a sensor array is contacted with a first odorant with a first vapor pressure to produce a response and then contacted with a second odorant with a vapor pressure lower than the first vapor pressure to produce a second response. Thereafter, the first response intensity is compared to the second response intensity. To validate that the sensor array detection ability mimics a human nose detection ability, the second response intensity will be greater than the first response intensity. The inventive method determines whether a sensor array mimics a human nose by evaluating its ability to respond differently to odorants with different vapor pressures.

The present methods are extremely useful in, for example, human smell panels, such as for tobacco, coffee, teas and the like. The methods of the present invention can be used in lieu of human sensory panels. Unlike human noses, electronic noses will not fatigue. As such, Applicants respectfully request that the Examiner withdraw the rejection.

CLAIM REJECTIONS UNDER 35 U.S.C. § 112, SECOND PARAGRAPH

The Examiner has rejected claims 1-16 as allegedly being indefinite for reciting a "human nose detection threshold". The Examiner argues that one cannot know what a standard threshold is since everyone has varying senses of smell depending on environmental conditions. To expedite prosecution, the claims have been amended to recite a "sensor array response ability" and a "human nose detection ability". To the extent the rejection is applicable to the new claim language, Applicants respectfully request that the rejection be withdrawn.

The claim language has been amended to clarify the novel features of the invention. Claims 9 and 17 are methods for validating that a sensor array behaves like a human nose; such methods are critical for ensuring that data from sensor arrays can reliably be used to infer the response of a human nose. By comparing responses to odorants with different vapor pressures, the methods allow comparison of the overall

"detection ability" of a sensor array with the overall "detection ability" of a human nose. As set forth and defined in Webster's Dictionary, the term "ability" means "the quality of being able to do something". In this case, it clearly refers to the general ability of a human nose or sensor array ***to detect*** an odorant. Furthermore, it is well known in the art that when terms such as "human detection ability" are used, they refer to the behavior of an "average" individual under "average" conditions and are not intended to encompass the wide range of a behavior in a population of individuals under varying environmental conditions.

Accordingly, Applicants also respectfully submit that even if the claims remain in their unamended form, such claims would still be definite. Contrary to the Examiner's assertion, human nose detection thresholds are clearly known in the art. Such thresholds are set forth in Figure 3, which is described on page 14, line 4 to line 14. Additional thresholds are set forth in references like Devo *et al.,* Standardized Human Olfactory Thresholds, Oxford University Press, NY, p.165 (1990)).

In view of the amendments and the above arguments, Applicants respectfully request that the rejection be withdrawn.

CLAIM REJECTIONS UNDER 35 U.S.C. § 102

Claims 1-7 and 9-15 have been rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by any prior art sensor which operates by responding to an analyte to produce a response.

"To anticipate a claim, a reference must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter" (*see, PPG Industries Inc. v. Guardian Industries Corp.*, 37 USPQ2d 1618, 1624 (Fed. Cir. 1996)).

To expedite prosecution, Applicants have amended the claims to recite a "method for validating that a sensor array detection ability mimics a human nose detection ability." In this regard, Applicants claim a method useful for establishing whether data from sensor arrays are comparable to data from human noses. Prior to the

present invention, it was known that electronic noses could be used to detect odorants; however, it was ***not known*** that a sensor array actually mimicked the detection ability of a human nose.

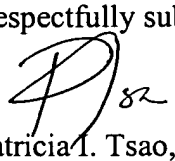
Applicants respectfully assert that in no instance do any references describing sensor arrays teach or suggest the steps of the methods of this invention, such as the comparison of response intensities elicited by odorants with different vapor pressures or the comparison of response intensities elicited by odorants at constant vapor pressures. In view of the fact that not all the elements of this claim are taught in the prior art, withdrawal of the anticipation rejection is respectfully requested.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,



Patricia T. Tsao, Ph.D.
Patent Agent
Reg. No. 50,713

TOWNSEND and TOWNSEND and CREW LLP
Two Embarcadero Center, 8th Floor
San Francisco, California 94111-3834
Tel: (415) 576-0200
Fax: (415) 576-0300
PIT
SF 1331863 v1

APPENDIX A: VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please amend the title as follows:

--METHOD FOR [MATCHING] VALIDATING THAT THE [INTENSITY] DETECTION ABILITY OF A SENSOR ARRAY MIMICS [TO] A HUMAN NOSE DETECTION [THRESHOLD] ABILITY --

Please amend claim 9 as follows:

9. (Amended) A method for validating that a sensor array response [intensity] ability [matches] mimics a human nose detection [threshold] ability, the method comprising:

(a) contacting said sensor array with a constant fraction of a known vapor pressure of a first odorant to produce a first response intensity;

(b) contacting said sensor array with said constant fraction of a known vapor pressure of a second odorant to produce a second response intensity; [and]

(c) comparing said first response intensity to said second response intensity; and

(d) determining whether said response intensities are similar, thereby validating that said sensor array response [intensity] ability [matches] mimics a human nose detection [threshold] ability.

APPENDIX B: PENDING CLAIMS AFTER AMENDMENTS ARE ENTERED

1. (Canceled)

2. (Canceled)

3. (Canceled)

4. (Canceled)

5. (Canceled)

6. (Canceled)

7. (Canceled)

8. (Canceled)

9. (Amended) A method for validating that a sensor array detection ability mimics a human nose detection ability, the method comprising:

(a) contacting said sensor array with a constant fraction of a known vapor pressure of a first odorant to produce a first response intensity;

(b) contacting said sensor array with a constant fraction of a known vapor pressure of a second odorant to produce a second response intensity;

(c) comparing said first response intensity to said second response intensity; and

(d) determining whether said response intensities are similar, thereby validating that said sensor array response detection ability mimics said human nose detection ability.

10. A method in accordance with claim 9, wherein said sensor array comprises at least two sorption-based sensors which are members selected from the group consisting of a chemiresistors, a conducting/nonconducting regions sensor, a SAW sensor, a metal oxide gas sensor, a bulk conducting polymer sensor, a Langmuir-Blodgett film sensor, and combinations thereof.

11. A method in accordance with claim 10, wherein said sensor is a conducting/nonconducting regions sensor.

12. A method in accordance with claim 10, wherein said sensor is a bulk conducting polymer sensor.

13. A method in accordance with claim 11, wherein said nonconducting region is an organic polymer.

14. A method in accordance with claim 13, wherein said organic polymer is a member selected from the group consisting of (poly(4-vinyl phenol), poly(-methyl styrene), poly(vinyl acetate), poly(sulfone), poly(caprolactone), poly(ethylene-co-vinyl acetate), poly(ethylene oxide), poly(ethylene), poly(butadiene), poly(vinylidine fluoride), poly(n-butyl methacrylate), poly(epichlorohydrin) and poly(ethylene glycol)).

15. A method in accordance with claim 9, wherein said odorant is a member selected from the group consisting of alkanes, alkenes, alkynes, dienes, alicyclic hydrocarbons, arenes, alcohols, ethers, ketones, aldehydes, carbonyls, carbanions, heterocycles, polynuclear aromatics, organic derivatives, biomolecules, microorganisms, bacteria, viruses, sugars, nucleic acids, isoprenes, isoprenoids, fatty acids and their derivatives.

16. (Canceled)

17. (New) A method for validating that a sensor array detection ability mimics a human nose detection ability, the method comprising:

(a) contacting said sensor array with a first odorant with a first vapor pressure to produce a first response intensity;

(b) contacting said sensor array with a second odorant with a vapor pressure lower than said first vapor pressure to produce a second response intensity;

(c) comparing said first response intensity to said second response intensity; and

(d) determining whether said second response intensity is greater than said first response intensity, thereby validating that a sensor array detection ability mimics a human nose detection ability.